

WHAT IS CLAIMED IS:

1. A signal processing apparatus which changes a magnification ratio of an image acquired by image sensing means, comprising:

5 first signal processing means for executing first signal processing for reducing an image sensing signal with respect to a scanning range of an obtained image sensing surface when the magnification ratio of the image is to be increased;

10 second signal processing means for executing second signal processing different from the first signal processing to change the magnification ratio of the image;

first detection means for detecting selection of
15 one of a telephoto side and a wide-angle side;

second detection means for detecting a limit of an increase in magnification ratio of the image by the first signal processing; and

selection means for selecting one of a first mode
20 and a second mode;

wherein when the first mode is selected by said selection means, and said first detection means detects that the telephoto side is continuously selected, the first signal processing is executed, and when said
25 second detection means detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, the second signal

processing is subsequently executed to enlarge the image, and

when the second mode is selected by said selection means, even when said second detection means
5 detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, and said first detection means then detects that the telephoto side is continuously selected, the second signal processing is inhibited.

10 2. The apparatus according to claim 1, wherein said first signal processing means further comprises spatial low-pass filter means for limiting a spatial frequency band of the image.

3. The apparatus according to claim 2, wherein said
15 spatial low-pass filter means changes a frequency characteristic of the spatial frequency band limit in accordance with a variable magnification ratio of said second signal processing means.

4. The apparatus according to claim 1, wherein said
20 second signal processing means further comprises edge enhancement means for enhancing an edge of the image.

5. The apparatus according to claim 4, wherein said edge enhancement means changes degree of enhancement of the edge in accordance with a variable magnification
25 ratio of said second signal processing means.

6. The apparatus according to claim 5, wherein in the first mode and the second mode, when the variable

magnification ratio of the image acquired by the image sensing means is $\times 1$, the first signal processing and the second signal processing are not executed.

7. The apparatus according to claim 1, wherein the
5 signal of the image is enlarged by the second signal processing.

8. A signal storage apparatus comprising signal storage means for storing a signal of an image,
wherein the signal of the image processed by a
10 signal processing apparatus of claim 1 is stored in said signal storage means.

9. An image recording apparatus comprising
a signal processing apparatus of claim 1; and
optical variable magnification means for changing
15 a view angle of an object image formed on a light-receiving surface of image sensing means,
wherein variable magnification by said optical variable magnification means is executed in first signal processing.

20 10. An image data generation apparatus which generates image data on the basis of image sensing data photographed by an image sensing element, comprising:
recording mode control means for controlling a first recording mode in which image data in a first
25 image format having a first image size corresponding to the number of pixels of the image sensing element is generated and recorded, and a second recording mode in

which image data in a second image format having a second image size smaller than the first image size is generated and recorded;

electronic variable magnification means for
5 executing electronic variable magnification processing in generating the image data in the second image format in the second recording mode;

maximum variable magnification ratio setting means for setting a maximum variable magnification
10 ratio in said electronic variable magnification means; and

variable magnification ratio change indication means for indicating a change in variable magnification ratio while defining, as a maximum value, the maximum
15 variable magnification ratio set by said maximum variable magnification ratio setting means,

wherein said maximum variable magnification ratio setting means sets, as the maximum variable magnification ratio, a maximum variable magnification
20 ratio candidate selected by a user from a plurality of types of maximum variable magnification ratio candidates, and said variable magnification ratio change indication means indicates, as a boundary line, a value of a maximum variable magnification ratio
25 candidate whose variable magnification ratio is lower than that of the maximum variable magnification ratio.

11. A signal processing method of changing a

magnification ratio of an image acquired by image sensing means, comprising:

5 a first signal processing step of executing first signal processing for reducing an image sensing signal with respect to a scanning range of an obtained image sensing surface when the magnification ratio of the image is to be increased;

10 a second signal processing step of executing second signal processing different from the first signal processing step to change the magnification ratio of the image;

a first detection step of detecting selection of one of a telephoto side and a wide-angle side;

15 a second detection step of detecting a limit of an increase in magnification ratio of the image by the first signal processing step; and

selection step of selecting one of a first mode and a second mode;

wherein in the selection step,

20 when the first mode is selected, and it is detected in the first detection step that the telephoto side is continuously selected, the first signal processing is executed, and when it is detected in the second detection step that the increase in
25 magnification ratio of the image by the first signal processing has reached the limit, the second signal processing is subsequently executed to enlarge the

image, and

when the second mode is selected, even when it is detected in the second detection step that the increase in magnification ratio of the image by the first signal processing has reached the limit, and it is then detected in the first detection step that movement from the wide-angle side to the telephoto side is continuously selected, the second signal processing is inhibited.

10 12. An image data generation method for generating image data on the basis of image sensing data photographed by an image sensing element, comprising:

a recording mode control step of controlling a first recording mode in which image data in a first image format having a first image size corresponding to the number of pixels of the image sensing element is generated and recorded, and a second recording mode in which image data in a second image format having a second image size smaller than the first image size is generated and recorded;

an electronic variable magnification step of executing electronic variable magnification processing in generating the image data in the second image format in the second recording mode;

25 a maximum variable magnification ratio setting step of setting a maximum variable magnification ratio in the electronic variable magnification step; and

a variable magnification ratio change indication step of indicating a change in variable magnification ratio while defining, as a maximum value, the maximum variable magnification ratio set in the maximum
5 variable magnification ratio setting step,

wherein in the maximum variable magnification ratio setting step, a maximum variable magnification ratio candidate selected by a user from a plurality of types of maximum variable magnification ratio
10 candidates is set as the maximum variable magnification ratio, and in the variable magnification ratio change indication step, a value of a maximum variable magnification ratio candidate whose variable magnification ratio is lower than that of the maximum
15 variable magnification ratio is indicated as a boundary line.

13. A program for a signal processing apparatus which changes a magnification ratio of an image acquired by image sensing means, comprising:

20 a first signal processing step of executing first signal processing for reducing an image sensing signal with respect to a scanning range of an obtained image sensing surface when the magnification ratio of the image is to be increased;

25 a second signal processing step of executing second signal processing different from the first signal processing step to change the magnification

ratio of the image;

a first detection step of detecting selection of one of a telephoto side and a wide-angle side;

a second detection step of detecting a limit of
5 an increase in magnification ratio of the image by the first signal processing step; and

selection step of selecting one of a first mode and a second mode;

wherein the signal processing apparatus is caused
10 to, in the selection step,

when the first mode is selected, and it is detected in the first detection step that the telephoto side is continuously selected, execute the first signal processing, and when it is detected in the second
15 detection step that the increase in magnification ratio of the image by the first signal processing has reached the limit, subsequently execute the second signal processing to enlarge the image, and

when the second mode is selected, even when it is
20 detected in the second detection step that the increase in magnification ratio of the image by the first signal processing has reached the limit, and it is then detected in the first detection step that movement from the wide-angle side to the telephoto side is
25 continuously selected, inhibit the second signal processing.

14. A program for an image data generation apparatus

which generates image data on the basis of image sensing data photographed by an image sensing element, comprising:

a recording mode control step of controlling a
5 first recording mode in which image data in a first image format having a first image size corresponding to the number of pixels of the image sensing element is generated and recorded, and a second recording mode in which image data in a second image format having a
10 second image size smaller than the first image size is generated and recorded;

an electronic variable magnification step of executing electronic variable magnification processing in generating the image data in the second image format
15 in the second recording mode;

a maximum variable magnification ratio setting step of setting a maximum variable magnification ratio in the electronic variable magnification step; and

a variable magnification ratio change indication
20 step of indicating a change in variable magnification ratio while defining, as a maximum value, the maximum variable magnification ratio set in the maximum variable magnification ratio setting step,

wherein the image data generation apparatus is
25 caused to, in the maximum variable magnification ratio setting step, setting, as the maximum variable magnification ratio, a maximum variable magnification

ratio candidate selected by a user from a plurality of types of maximum variable magnification ratio candidates, and in the variable magnification ratio change indication step, indicating, as a boundary line,

5 a value of a maximum variable magnification ratio candidate whose variable magnification ratio is lower than that of the maximum variable magnification ratio.

15. An image sensing apparatus which has an optical zoom function and an electrical zoom function and in which a sensed image at a photographing magnification ratio covered by the optical zoom function is recorded as a reduced image obtained by reducing the sensed image to an image having a predetermined number of pixels smaller than the number of pixels of the sensed image, and when photographing at a magnification ratio more than a maximum photographing magnification ratio covered by the optical zoom function is instructed, an image generated from the sensed image by using the electrical zoom function is recorded, comprising:

20 storage means for storing a set value representing, of photographing magnification ratios that the electrical zoom function copes with, a maximum magnification ratio to be used in image sensing;

first electrical zoom means for extracting the image having the predetermined number of pixels from the sensed image to obtain an enlarged image;

second electrical zoom means for extracting a

partial image of the enlarged image and enlarging the partial image to the image having the predetermined number of pixels to obtain an enlarged image; and

switching means for switching, in accordance with
5 the set value, between image sensing which is to be executed by using both of said first electrical zoom means and said second electrical zoom means and image sensing which is to be executed by using only said first electrical zoom means.

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